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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/030,342	12/28/2001	Fergus O'Brien	27795-00025	5883
23932 7590 02/26/2007 JENKENS & GILCHRIST, PC 1445 ROSS AVENUE SUITE 3200 DALLAS, TX 75202			EXAMINER STRANGE, AARON N	
			ART UNIT 2153	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/26/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/030,342

Applicant(s)

O'BRIEN ET AL.

Examiner

Aaron Strange

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 November 2006.  
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 8-18 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 8-18 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments filed 11/13/06 have been fully considered but they are not persuasive.
2. With regard to Applicant's assertion that there is no motivation to combine Annapareddy and Watts, the Examiner respectfully disagrees. Annapareddy discloses a computer network, similar to many that are known in the art. Watts teaches that the average path length between nodes can be significantly reduced by adding a few random cross links. Reduction of average path length is always advantageous in computer networks, since it reduces the time and overhead required to transmit information.
3. With regard to Applicant's assertion that "the present invention, as claimed, for the first time provides such a strategy [for determining and achieving optimal small world connectivity]", the Examiner respectfully disagrees. The invention as claimed contains no limitations directed toward determining or achieving optimal small world connectivity. The present claims (Claim 1) merely state "connecting ... node clusters via the plurality of cross-links such that the system comprises a small-world network". This does not describe any determination or optimization of a network.

The Examiner respectfully submits that claims directed to a "small-world network"

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generically are unlikely to be allowable, since small world networks existed prior to the filing of the present application. For example, the World Wide Web is known to be a small world network (See "The Small World Web", Cited on PTO-892 of 3/16/2005). The World Wide Web existed prior to the filing of the present application.

While Applicant may have invented a method for "determining and achieving optimal small-world connectivity", as asserted, the current claims do not capture this concept. The Examiner recommends amending the claims to accurately reflect the steps taken by Applicant to determine and implement an optimal connectivity.

***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. The term "substantially" in claim 1 (lines 6 and 8) is a relative term which renders the claim indefinite. The term "substantially" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear how much higher the clustering coefficient must be to be considered "substantially higher" or how much lower the characteristic path length must

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be to be considered "substantially lower". Claim 14 is rejected under the same rationale, since it contains substantially identical limitations.

7. All claims not individually rejected are rejected by virtue of their dependency from the above nodes.

***Claim Rejections - 35 USC § 103***

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 8-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Annapareddy et al. (US 5,602,839) in view of Watts et al. ("Collective dynamics of 'small-world' networks").

10. With regard to claim 8, Annapareddy discloses a method for constructing a system (the system shown in Fig 2), comprising:

interconnecting a plurality of computing nodes (Col 5, Lines 45-47)(Fig 2, n1, n2, etc) to form a plurality of node clusters (groups),

providing a plurality of cross links between the node clusters (Col 5, Lines 53-59 and Fig 2). Annapareddy fails to specifically disclose selecting the cross-links such that the system comprises a small world network.

Watts discloses a small world network wherein cross-links (edges) are provided between said node clusters (Fig 1); and wherein the cross links are selected such that the system comprises a small-world network (Col 1, ¶¶2-4 and Fig 1); and

wherein the small-world network comprises a substantially higher clustering coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding randomly-connected network (Col 1, ¶¶4 and Fig 2).

This would have been an advantageous modification to the system disclosed by Annapareddy since it would have significantly reduced the average path length, resulting in reduced latency and more efficient routing on the network, since the average number of hops required to reach a distant node would be decreased.

11. With regard to claim 9, Watts further discloses that the cross-links between the node clusters are selected at random (Col 1, ¶¶2).

12. With regard to claim 10, Annapareddy further discloses that the node clusters are fully interconnected (each node in a group connects to all others in the group) (Fig 2).

13. With regard to claims 11 and 12, while the system disclosed by Annapareddy in view of Watts shows substantial features of the claimed invention (discussed above), it fails to specifically disclose that the average path length between the nodes is less than 2.0, or, more specifically, between 1.5 and 1.7.

Watts teaches that adjusting parameters of a small-world network results in changes in the characteristic path length. Adding a few cross-links results in a large drop in the path length (Fig 2), while substantially maintaining the clustering of the network. It would have merely been a matter of preference to a designer of the system to adjust the parameters of the network to obtain any desired average path length, such one between 1.5 and 1.7.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the number of cross links to obtain a mean connectivity of 1.5-1.7 or any average path length desired by the designer of the system, based on the intended goal of the system.

14. Claim 13 is rejected under the same rationale as claim 1, since they recite substantially identical subject matter. Any differences between the claims do not result in patentably distinct claims and all of the limitations are taught by the above cited art.

15. Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Annapareddy et al. (US 5,602,839) in view of Watts et al. in further view of Brewer et al. (US 5,859,975).

16. With regard to claims 14 and 18, while the system disclosed by Annapareddy in view of Watts shows substantial features of the claimed invention (discussed regarding claim 8), it fails to disclose that each node has a plurality of interconnected processors.

Brewer discloses that the use of multiple processors in a single node of a distributed system is well-known in the art (Col 1, Lines 26-31). The use of multiple processors in a single node allows that node to process more information than it would be capable with only a single processor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a plurality of interconnected processors in each node since it would have allowed the nodes to process more information that they would be capable of processing with only a single processor.

17. Claims 15-17 are rejected under the same rationale as claims 9,11 and 12, since they recite substantially identical subject matter.

18. Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barthelemy ("Small World Networks: Evidence for a Crossover Picture") in view of Official Notice.



19. With regard to claim 8, Barthelemy discloses a method for constructing a scalable system, the method comprising:

interconnecting a plurality of nodes to form a plurality of node clusters (start from a regular network)(Page 3181, Col 2, ¶2);

providing a plurality of cross-links between the node clusters (vertices are connected to neighbors) (Page 3181, Col 2, ¶2);

directly connecting the plurality of node clusters via the plurality of cross-links such that the system comprises a small world network (apply rewiring algorithm)(Page 3181, Col 2, ¶2 to Page 3182, Col 1, ¶1); and

wherein the small-world network comprises a substantially higher clustering coefficient of nodes in comparison with a corresponding randomly-connected network in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding regularly-connected network (Page 3182, Col 2, ¶1).

Barthelemy fails to specifically disclose that the nodes are computing nodes. The Examiner takes Official Notice that computing nodes are old and well known in the art. Barthelemy suggests that the nodes could be computing nodes (Page 3183, Col 1, ¶5). The use of computing nodes would have been an advantageous addition to the system disclosed by Barthelemy since it would have reduced the average number of hops needed to reach different points on the network, decreasing latency.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use computing nodes in the system disclosed by

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Barthelemy since it would have created a more efficient computer network by reducing the average number of hops between any two points on the network.

20. With regard to claim 9, Barthelemy further discloses that the cross-links are provided in accordance with a random or pseudo-random process (Page 3181, Col 2, ¶2).

21. With regard to claim 10, Barthelemy further discloses that the step of interconnecting the plurality of computing nodes is performed such that the nodes are fully interconnected (each of the vertices is connected to its neighbors) (Page 3181, Col 2, ¶2).

22. With regard to claims 11 and 12, while the system disclosed by Barthelemy shows substantial features of the claimed invention (discussed above), it fails to specifically disclose that the average path length between the nodes is less than 2.0, or, more specifically, between 1.5 and 1.7.

Barthelemy teaches that adjusting parameters of a small-world network results in changes in the average path length (Page 3180, Col 2, ¶1 and Fig 1). Adding a few cross-links results in a large drop in the path length, while substantially maintaining the clustering of the network. It would have merely been a matter of preference to a designer of the system to adjust the parameters of the network to obtain any desired average path length, such one between 1.5 and 1.7.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the number of cross links to obtain an average path length of 1.5-1.7 or any average path length desired by the designer of the system, based on the intended goal of the system.

23. Claims 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barthelemy in view of Official Notice in further view of Brewer et al. (US 5,859,975).

24. With regard to claims 14 and 18, while the system disclosed by Barthelemy shows substantial features of the claimed invention (discussed regarding claim 8), it fails to disclose that each node has a plurality of interconnected processors.

Brewer discloses that the use of multiple processors in a single node of a distributed system is well-known in the art (Col 1, Lines 26-31). The use of multiple processors in a single node allows that node to process more information than it would be capable with only a single processor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have a plurality of interconnected processors in each node since it would have allowed the nodes to process more information that they would be capable of processing with only a single processor.

25. Claims 15-17 are rejected under the same rationale as claims 9,11 and 12, since they recite substantially identical subject matter.

***Conclusion***

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Strange whose telephone number is 571-272-3959. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glen Burgess can be reached on 571-272-3949. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AS  
2/16/07



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PRIMARY EXAMINER